SCIENTIFIC PAPER

Laparoscopic Inguinal Exploration and Mesh Placement for Chronic Pelvic Pain

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ABSTRACT

Background and Objective: Chronic pelvic pain affects 15% of women. Our objective was to evaluate empiric laparoscopic inguinal exploration and mesh placement in this population.

Methods: Retrospective cohort with follow-up questionnaire of women with lateralizing chronic pelvic pain (right or left), ipsilateral inguinal tenderness on pelvic examination, no clinical hernia on abdominal examination, and ipsilateral empiric laparoscopic inguinal exploration with mesh placement (2003–2009). Primary outcome was pain level at the last postoperative visit. Secondary outcomes were pain level and SF-36 scores from the follow-up questionnaire.

Results: Forty-eight cases met the study criteria. Surgery was done empirically for all patients, with only 7 patients (15%) found to have an ipsilateral patent processus vaginalis (shallow peritoneal dimple or a deeper defect (occult hernia)). Of 43 cases informative for the primary outcome, there was pain improvement in 15 patients (35%); pain improvement then return of the pain in 18 patients (42%); and pain unchanged in 9 patients (21%) and worse in 1 patient (2%). Improvement in pain was associated with a positive Carnett's test in the ipsilateral abdominal lower quadrant ($P = .024$). Thirteen patients returned the questionnaire (27%), and the pain was now described as improved in 9 patients (69%), unchanged in 4 patients (31%), and worse in none. Three SF-36 subscales showed improvement (physical functioning, social functioning, and pain).

Conclusion: In select women with chronic pelvic pain, empiric laparoscopic inguinal exploration and mesh placement results in moderate improvement in outcome. A positive Carnett's test in the ipsilateral abdominal lower quadrant is a predictor of better outcome.

Key Words: Chronic pelvic pain, Laparoscopy, Inguinal, Mesh.

INTRODUCTION

Chronic pelvic pain (at least 6 mo duration) affects up to 15% women, can have a devastating impact on quality-of-life, and can be of musculoskeletal, neuropathic, gastrointestinal, urologic, or gynecologic origin.[1] One musculoskeletal cause of chronic pelvic pain is a hernia, which may be inguinal, obturator, femoral, sciatic, ventral, Spigelian, or incisional.[2] If an inguinal (indirect) hernia is present, surgical repair of such hernias is effective for treatment of chronic pelvic pain.[3] One method of repair is transabdominal preperitoneal (TAPP), involving laparoscopic exploration and placement of mesh at the inguinal canal.[4]

However, most women with chronic pelvic pain will not have a clinical hernia. Two abstracts have described empiric laparoscopic inguinal exploration and mesh placement in women with chronic pelvic pain but without a clinical hernia.[5,6] It is important to determine whether this empiric treatment is indeed evidence-based, in particular whether it is safe and effective in women with chronic pelvic pain. In this retrospective study with follow-up questionnaire, we review our experience with empiric laparoscopic exploration and mesh placement in women with lateralizing chronic pelvic pain (right or left), no evidence of clinical hernia on abdominal examination, and ipsilateral inguinal tenderness on pelvic examination.

MATERIALS AND METHODS

The BC Women's Center for Reproductive Health is an academic tertiary referral center affiliated with the University of British Columbia, which specializes in chronic pelvic pain and endometriosis and in reproductive endocri-

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In memory of Rachael Bagnall, medical student and research assistant on this project, who passed away before the study could be completed.

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nology and infertility. Patients referred for chronic pelvic pain or endometriosis, or both, are given an initial preoperative questionnaire that includes the 36-Item Short Form Health Survey (SF-36) for quality-of-life.[7] In addition to an abdominal examination and ultrasound-guided pelvic examination, patients who exhibit lateralizing chronic pelvic pain (right- or left-sided) are examined for inguinal tenderness. On pelvic examination, a single digit is placed above the cervix, ventrally towards the pubic bone, then laterally towards the inguinal canal and the internal ring. During laparoscopy under low pressures, the examining digit can be seen approaching the insertion of the round ligament into the pelvic sidewall where it then dives caudally into the internal ring and inguinal canal. If inguinal tenderness on pelvic examination is demonstrated ipsilateral to the patient's lateralizing chronic pelvic pain, then the patient is offered ipsilateral laparoscopic inguinal exploration and mesh placement in addition to other indicated procedures (e.g., excision of endometriosis).

Surgical technique **(Figure 1)**: After laparoscopic entry, use of 3 or 4 ports, and inspection for inguinal abnormalities, an incision is made ventral to where the round ligament enters the pelvic sidewall, with attention to avoid the inferior epigastric. The extraperitoneal space is explored until the round ligament is seen diving into the

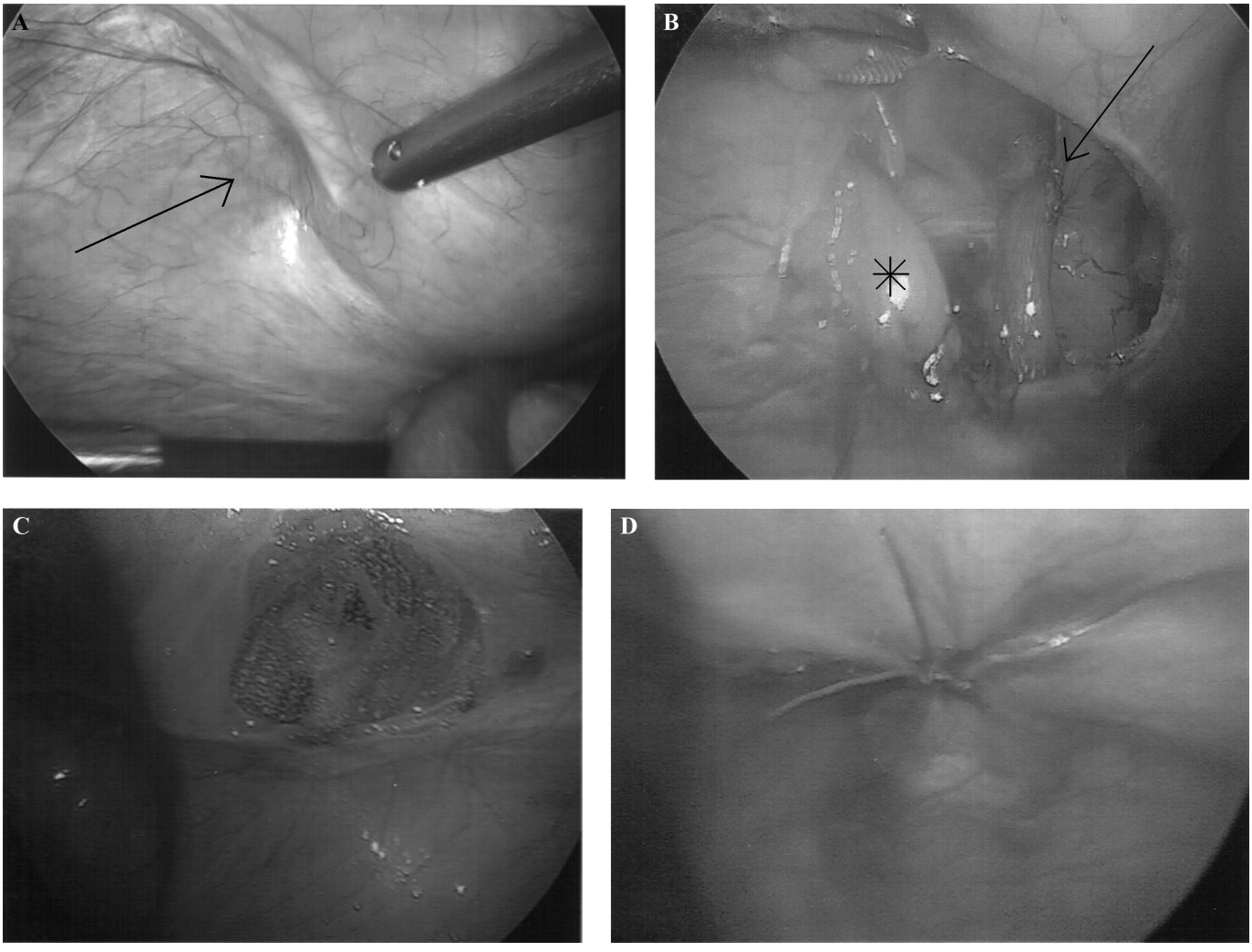

Figure 1. Laparoscopic inguinal exploration and mesh. **(A)** Example of a patent processus vaginalis [arrow] lateral to insertion of the round ligament into the pelvic sidewall. **(B)** Opening of extraperitoneal space near the round ligament insertion into the pelvic sidewall where it dives into the internal ring [arrow], with accompanying fat [asterisk], which is removed prior to mesh placement. **(C)** Mesh placement over the round ligament and internal ring. **(D)** Extraperitonealization of the mesh.

inguinal internal ring to the inguinal canal. Fat is removed from around the ligament at its entry into the internal ring, and then an approximately 3-cm x 4-cm piece of polypropylene mesh is placed over the round ligament and the internal ring. The peritoneum is then sutured to extraperitonealize the mesh, usually incorporating a piece of mesh in the suture to avoid mesh migration.

We performed a retrospective review of empiric laparoscopic inguinal exploration and mesh placement done by 2 surgeons (CW and CA) at the BC Women's Center for Reproductive Health. Inclusion criteria were lateralizing chronic pelvic pain, ipsilateral inguinal tenderness on pelvic examination, and ipsilateral empiric laparoscopic inguinal exploration and mesh placement (2003–2009). Exclusion criterion was the presence of a clinical hernia on abdominal examination. Medical records were reviewed (preoperative to postoperative), including the preoperative SF-36 and the level of pain at the last postoperative visit. For the follow-up questionnaire component of the study, patients were sent a package by mail that included a consent form for the study and a postoperative questionnaire containing another copy of the SF-36 and a question about the current level of pain. The study was approved by the research ethics boards of the University of British Columbia and BC Women's and Children's Hospitals (H09−00025).

The primary (short-term) outcome was the level of pain at the last postoperative visit, which was coded as follows: 1) Improvement (complete or partial resolution); 2) Improvement then return of the pain; 3) No change; or 4) Worse. The primary outcome was tested for an association with the following predictor variables: age; BMI; nulliparity; side of the pain (right or left); duration of pain; pain characteristics (cyclical or noncyclical); previous laparoscopy; other chronic pelvic pain diagnosis (endometriosis, interstitial cystitis, irritable bowel syndrome, vulvodynia, or psychiatric comorbidity); ipsilateral abdominal lower quadrant tenderness; positive Carnett's test in the ipsilateral abdominal lower quadrant indicative of abdominal wall pain (positive Carnett test=worsening or no change in tenderness with abdominal wall flexion/contraction); laparoscopic diagnosis of a patent processus vaginalis at the round ligament insertion into the sidewall, either a shallow peritoneal dimple or a larger defect (occult hernia) **(Figure 1)**[8]; laparoscopic findings after exploration of the ipsilateral inguinal internal ring; laparoscopic abnormality of the contralateral inguinal region; concurrent excision of endometriosis classified as symptomatic, defined as ipsilateral to the pain and tender on physical examination (i.e., tender in the ipsilateral cul-desac, uterosacral ligament, sidewall, or adnexa); concurrent excision of endometriosis classified as incidental, defined as contralateral or nontender on physical examination; and other concurrent procedures. Endometriosis was confirmed on histology in all cases. In addition, we reviewed the intraoperative and postoperative complications, and the number of patients requiring reoperation for pelvic pain.

Secondary (long-term) outcomes were from the mailed follow-up postoperative questionnaire containing the SF-36 and a question about the current level of pain. The questionnaire asked whether the pain was currently improved, unchanged, or worse. The SF-36 from the follow-up questionnaire (postoperative) was compared to the SF-36 from the initial questionnaire (preoperative). The SF-36 was scored as per the RAND SF-36 1.0 protocol, which derives 8 subscales based on 35 questions with 1 additional question about health change over the last year (http://www.rand.org/health/surveys_tools/mos/mos_core_36item.html) **(Table 1)**. Each subscale and the health change question are scored from 0–100, with a higher score indicating better quality-of-life.[7]

Statistical analyses were carried out using SPSS 19.0. For descriptive statistics, means are described as ±-1 standard deviation. For tests of association between the primary outcome and the predictor variables, the nonparametric 2-tailed Mann-Whitney and Spearman rank correlation tests were utilized because of nonnormality and nondirectional hypotheses; for the change in SF-36 scores, the parametric 1-tailed paired-sample *t* test was utilized. Linear regression modeling was performed using likelihood ratio model building. α=0.05.

RESULTS

Forty-eight patients met the inclusion criteria. No patients were excluded (i.e., none had a clinical hernia on abdominal examination). Characteristics of the 48 patients are summarized in Table 1. Of note, 38 patients (79%) had had a previous laparoscopy, and of these, almost all (n = 35) had had a previous laparoscopy for the same pain. The procedures performed at the previous laparoscopy are also summarized in Table 1.

At the time of empiric laparoscopic inguinal exploration and mesh placement, there was a laparoscopic diagnosis of an ipsilateral patent processus vaginalis in 7 patients (15%) **(Table 1; Figure 1)**; in an additional 5 patients (10%), there were laparoscopic findings after exploration of the ipsilateral inguinal internal ring **(Table 1)**. Empiric

Table 1.
Predictor Variables

Predictor Variable	Study Sample (n = 48)[a]
History	
Age	31.4 ± 9.2
BMI	24.4 ± 3.9
Nulliparity (%)	24 (51)
Side of Pain (%)	R=27 (56)
	L=18 (38)
	Bilateral =3 (6)
Duration of Pain (%)	<1 year=8 (18)
	1–5 years=16 (36)
	>5 years=21 (47)
Pain Characteristics[b] (%)	Cyclical=24 (57)
	Non-cyclical=18 (43)
Previous Laparoscopy[c] (%)	38 (79)
At Least One Other Chronic Pelvic Pain Diagnosis[d] (%)	35 (73)
Endometriosis	22 (46)
Interstitial cystitis	3 (6)
Irritable bowel syndrome	6 (13)
Vulvodynia	3 (6)
Psychiatric comorbidity	10 (21)
Other[e]	3 (6)
Initial SF-36 Score (from the Pre-operative Questionnaire)	
Physical functioning	68.2 ± 27.0
Role functioning (physical)	33.1 ± 36.1
Role functioning (emotional)	59.5 ± 42.6
Energy/Fatigue	38.6 ± 23.1
Emotional well-being	64.5 ± 18.6
Social functioning	59.7 ± 25.0
Pain	42.7 ± 22.5
General health	58.2 ± 20.7
Health change	35.8 ± 28.7
Examination	
Ipsilateral Abdominal Lower Quadrant Tenderness (%)	38 (79)
Positive Carnett's Test in the Ipsilateral Abdominal Lower Quadrant (%)	13 (27)

Table 1. (Continued)
Predictor Variables

Predictor Variable	Study Sample (n = 48)[a]
Surgical	
Before Exploration: Ipsilateral Patent Processus Vaginalis at the Inguinal Internal Ring[f] (%)	7 (15)
After Exploration: Ipsilateral Findings at the Inguinal Internal Ring[g] (%)	5 (10)
Contralateral Inguinal Abnormality[h] (%)	4 (8)
Concurrent Excision of Symptomatic Endometriosis[i] (%)	4 (8)
Concurrent Excision of Incidental Endometriosis[j] (%)	13 (27)
Other Concurrent Laparoscopic Procedure[k] (%)	8 (17)

[a]Denominator depends on the number of informative cases for each predictor variable.

[b]Six patients had a previous hysterectomy.

[c]Of the 38 patients with previous laparoscopy, 35 had the previous laparoscopy for the same pain involving the following procedures: treatment of endometriosis (n=16), diagnostic procedure only (n=11), ovarian cystectomy (n=2), treatment of endometriosis and ovarian cystectomy (n=1), empiric appendectomy (n=1), empiric appendectomy and paratubal cystectomy (n=1), salpingectomy (n=1), lysis of adhesions (n=1), and hysterectomy (n=1).

[d]Some patients had more than one other diagnosis.

[e]History of pelvic fractures, previous PID requiring hysterectomy, and inflammatory bowel disease.

[f]Before exploration, there was a patent processus vaginalis, which appeared as a shallow dimple or larger defect (occult hernia) at the peritoneum near the round ligament insertion into the pelvic sidewall (where it later enters the ipsilateral inguinal internal ring)[f] (**Figure 1**).

[g]After exploration, there was evidence of an "inguinal hernia," a "small defect," or "large amount of fat" at the ipsilateral inguinal ring.

[h]Findings at the contralateral (nonpainful, nontender side) inguinal region: 3 patients with a patent processus vaginalis[h]; and 1 patient with a direct inguinal hernia.

[i]Excision of endometriosis that was ipsilateral and tender on physical exam (ie, tender in the ipsilateral cul-de-sac, uterosacral ligament, sidewall, or adnexa). Endometriosis was confirmed on histology.

[j]Exicision of endometriosis that was either contralateral or non-tender on physical examination. Endometriosis confirmed on histology.

[k]Included an ipsilateral ovarian suspension, ipsilateral salpingo-oophorectomy, ipsilateral lysis of adhesions, and empiric appendectomy, as well as procedures that were done for other indications (contralateral ovarian cystectomy, contralateral salpingo-oophorectomy, contralateral salpingectomy of accessory fallopian tube, and tubal ligation).

ipsilateral inguinal exploration and mesh placement was done for all patients, regardless of whether these findings were present or not. In addition, 4 patients (8%) had a laparoscopic abnormality of the contralateral inguinal region (the side with no pain or tenderness; Table 1), which was not explored or repaired. Four patients (8%) had a concurrent excision of endometriosis classified as symptomatic, while 13 patients (27%) had concurrent excision of endometriosis classified as incidental **(Table 1)**.

Five patients did not return for a postoperative visit, and therefore 43 patients were informative for the primary outcome (pain level at the last postoperative visit). The average time to the last postoperative visit was 12.6 ± 14.2 mo (range ≤ 1 to 58) from the date of surgery. For the primary (short-term) outcome, there was pain improvement in 15 patients (35%) (complete resolution in 3 and partial resolution in 12 patients), pain improvement then return of the pain in 18 patients (42%), and pain unchanged in 9 patients (21%) and worse in 1 patient (2%). The average time to return of the pain was 8.7±-9.8 mo (range ≤ 1 to 34) from the date of surgery, and triggers were trauma (n = 3), sports (n = 2), pregnancy (n = 2), bikini wax (n = 1), and unknown (n = 10).

The predictor variables are listed in Table 1. Neither a concurrent surgical procedure (such as excision of endometriosis, whether classified as symptomatic or incidental), nor the presence of an ipsilateral patent processus vaginalis, was associated with the primary outcome **(Table 1)**. The only predictor variable significantly associated with the primary outcome was a positive Carnett's test in the ipsilateral abdominal lower quadrant, with a positive Carnett's test associated with improvement of the pain at the last postoperative visit (Spearman's rho = 0.34, $P = .024$). Of the 11 patients with a positive Carnett's test informative for the primary outcome, improvement occurred in 8 patients (73%) (complete resolution in 2 and partial resolution in 6 patients), improvement then return of the pain in 2 patients, no change in 1 patient, and worsening in no patients. Of the 32 patients with a negative Carnett's test, improvement occurred in 7 patients (22%) (complete resolution in 1 and partial resolution in 6 patients), improvement then return of the pain in 16 patients, no change in 8 patients, and worsening in 1 patient. None of the other predictor variables in Table 1 had an association with the primary outcome.

In addition, there was possible evidence of selection bias, as patients who had a longer time to the last postoperative visit had a trend towards more pain for the primary outcome (Spearman's rho=-.31, $P = .045$). However, when a linear regression model was constructed with a positive Carnett's test and time to last postoperative visit as predictor variables for the primary outcome, the time to last postoperative visit fell out of the model ($P = .14$) with only the positive Carnett's test remaining significant ($P = .024$).

There were no intraoperative complications, and the postoperative complications were mild and uncommon (10%): hospitalization for postoperative pain (n = 2), bladder infection (n = 1), endometritis (n = 1), and "slow recovery" (n = 1). Eight patients required reoperation for pain (17%), which included repeat laparoscopy for mesh removal (n = 3), open groin exploration by a general surgeon (n = 2), hysterectomy (n = 1), hysterectomy and ipsilateral salpingo-oophorectomy (n = 1), and unknown (n = 1). One patient requested mesh removal after a motor vehicle accident resulted in return of the pain, and no inguinal abnormality was noted during repeat laparoscopy. A second patient requested mesh removal after return of the pain secondary to trauma, and again no inguinal abnormality was noted. A third patient requested mesh removal after the pain returned (unknown cause), and the inguinal canal looked slightly inflamed and thickened with pathology showing mild chronic and foreign body inflammation. None of these patients had significant improvements in their pain after mesh removal (and one patient requested repeat inguinal exploration and mesh placement), although follow-up was limited. An additional 2 patients were referred to a general surgeon and underwent open groin exploration. One of these patients had experienced no improvement after laparoscopic inguinal exploration and mesh placement, while the other patient had experienced improvement then return of the pain. After open groin exploration, both patients had an initial improvement, then return of the same pain within 3 mo.

For the secondary (long-term) outcomes, 13 patients (27%) returned the questionnaire. The time between the surgery and the date of the questionnaire was 73.2 ± 30.6 mo (range = 23 to 102). There was no evidence of selection bias, as these 13 patients had a similar distribution for the primary outcome (improvement in 4, improvement then return of the pain in 5, no change in 3, and worse in 0) compared to the rest of the sample ($P = .54$), and similar initial (preoperative) SF-36 subscale scores compared to the rest of the sample ($P = .39$ to 0.98). In these 13 patients who returned the follow-up questionnaire, pain was now described as being improved in 9 patients (69%), unchanged in 4 patients (31%), and worse in 0 patients. Three SF-36 subscales improved from the initial questionnaire (preoperative) to the follow-up questionnaire (postoperative): physical functioning ($P = .032$), social func-

tioning ($P = .036$), and pain ($P = .035$) **(Table 2)**. The SF-36 question about health change also improved ($P = .003$) **(Table 2)**.

DISCUSSION

In this retrospective study with follow-up questionnaire, we found that empiric laparoscopic inguinal exploration and mesh placement in women with lateralizing chronic pelvic pain (right or left), no clinical hernia on abdominal examination, and ipsilateral inguinal tenderness on pelvic examination, resulted in improvement in 35% and improvement with return of the pain in 42% at the time of the last postoperative visit. Of the 27% of patients who returned a questionnaire for long-term follow-up, 69% reported their pain was improved, and several SF-36 subscales showed improvement (physical functioning, social functioning, pain) in addition to an improvement in health change over the last year. Complications were uncommon and mild. Three patients with return of pain requested mesh removal, without significant improvement in symptoms.

The primary outcome was not found to be associated with the presence or absence of an ipsilateral patent processus vaginalis. It should be emphasized that the surgery was done empirically in all patients, regardless of whether the ipsilateral inguinal region looked normal or whether there was an ipsilateral patent processus vaginalis. The incidence of patent processus vaginalis in this study (15%) is consistent with previous reports.[8]

In this study population, it is thought that the chronic pelvic pain and inguinal tenderness may arise from incarcerated fat in the inguinal canal.[5] The goal of the surgery is to decompress the ilioinguinal nerve by removing the fat and placing a mesh at the internal ring. There have only been 2 reports of empiric laparoscopic inguinal exploration and mesh placement in women with chronic pelvic pain, some of whom with inguinal tenderness on pelvic examination. A review cited an abstract stating that 80% to 85% of women with chronic pelvic pain obtain "significant": or complete resolution of their pain with laparoscopic inguinal exploration and mesh placement, although sample size was not provided.[5] In another abstract, Janicki et al.[6] reported on 21 women with chronic pelvic pain who underwent laparoscopic inguinal exploration and mesh placement, and found that 74% to 78% had "great" improvement or complete resolution of their pain at 6 mo to 12 mo. Hussain et al.[9] also reported a high cure rate (70%) for the same surgery for chronic groin pain (n = 43), although their study sample was 93% male and the majority had a dilated external ring on examination. Our study had a more modest improvement rate, which may be because three-fourths of our study sample had a comorbid chronic pelvic pain diagnosis and half had pain lasting more than 5 y **(Table 1)**, suggesting many women with chronic pain syndrome, central sensitization, and hyperalgesia. In addition, we found 42% of patients had an initial improvement then the pain returned after an average of 8.7 mo. These patients may have experienced a true recurrence due to failure of the procedure, or else have had a temporary placebo effect of the laparoscopy. In a randomized trial for laparoscopic excision of endometriosis, Abbott et al.[10] found that about one-third of patients will have pain improvement at 6 mo from a placebo diagnostic laparoscopy.

Table 2.
Comparison of SF-36 Subscale Scores

SF-36	Initial Questionnaire (Preoperative)	Follow-up Questionnaire (Postoperative)	Paired Sample *t test*	P-Value
Physical functioning	66.0 ± 33.0	84.2 ± 16.6	2.06	**.032**
Role functioning (physical)	31.3 ± 37.1	56.3 ± 44.1	1.59	.07
Role functioning (emotional)	69.4 ± 43.7	58.3 ± 42.9	0.60	.28
Energy/Fatigue	39.7 ± 28.1	47.1 ± 23.2	0.92	.19
Emotional well-being	67.3 ± 17.5	72.8 ± 16.4	0.76	.23
Social functioning	58.3 ± 29.4	76.0 ± 17.2	1.99	**.036**
Pain	43.5 ± 22.4	59.6 ± 19.9	2.02	**.035**
General health	59.2 ± 24.4	70.0 ± 20.0	1.50	.08
Health change	29.2 ± 20.9	58.3 ± 19.5	3.39	**.003**

Weaknesses of our study include a low response rate for the follow-up questionnaire (27%) and the lack of a separate control group. However, the patients who returned the follow-up questionnaire had a similar distribution for the primary outcome and the initial (preoperative) SF-36 subscale scores compared to the patients who did not return the questionnaire (see Results), suggesting a lack of selection bias. In addition, it is not possible to formally rule out a placebo effect of the surgery without a separate placebo control group, which would be difficult for this study (i.e., it would require a group assigned to diagnostic laparoscopy only). Finally, a proportion of patients had concurrent surgical procedures including excision of endometriosis **(Table 1)**: 8% had a concurrent excision of endometriosis classified as symptomatic and 27% had concurrent excision of endometriosis classified as incidental. Although we believe there to be a rational basis for this subdivision of endometriosis (as defined in the Methods), we acknowledge that we cannot be certain that incidental endometriosis was truly incidental and unrelated to the patient's pain. In addition, although concurrent excision of endometriosis, whether symptomatic or incidental, was not associated with the primary outcome (see Results), we acknowledge that concurrent excision of endometriosis should still be considered a confounder in this study.

Strengths of the study include a larger sample size than previous studies, long follow-up for the group who returned the questionnaire (73 mo) compared to previous studies, and the incorporation of a quality-of-life measure (SF-36). In particular, the improvement in SF-36 scores for physical functioning, social functioning, pain, and the health change question were not only statistically significant but also clinically significant, being much larger than the minimally clinically important difference of 3 to 5 points.[7]

The only predictor variable associated with improvement of the pain at the last postoperative visit (i.e., the primary outcome) was the presence of a positive Carnett's test in the ipsilateral abdominal lower quadrant. A positive Carnett's test is a manifestation of abdominal wall pain, of which one cause is neuropathic such as iatrogenic or spontaneous ilioinguinal injury.[11,12] The ilioinguinal nerve may provide sensation to an area above the inguinal ligament in the abdominal lower quadrant.[12,13] Therefore, it is possible that our patients with a positive Carnett's test in the ipsilateral abdominal lower quadrant may have some sort of ilioinguinal neuropathy contributing to their pain. Laparoscopic exploration and mesh placement could decompress the ilioinguinal nerve in the inguinal canal, and therefore may improve this ilioinguinal pain. None of our patients had a diagnostic ilioinguinal nerve block, which has been used for diagnosis of entrapment prior to ilioinguinal neurolysis or nerve resection through an abdominal incision.[12,14] In the future, a diagnostic ilioinguinal block may also be useful to identify which women may respond to empiric laparoscopic inguinal exploration and mesh.

CONCLUSION

Our study found moderate improvement in pain and quality-of-life after empiric laparoscopic inguinal exploration and mesh placement in women with lateralizing chronic pelvic pain, no clinical hernia on abdominal examination, and ipsilateral inguinal tenderness on pelvic examination. Patients with a positive Carnett's test in the ipsilateral abdominal lower quadrant had the best response. Future research should include a prospective study, ideally with randomization. For example, patients could be randomized to laparoscopic inguinal exploration and mesh placement, or to medical management with neuromodulator medications and/or hormonal suppression. We consider such a prospective randomized study to be an important step before empiric laparoscopic exploration and mesh placement can be widely accepted as a treatment modality for women with chronic pelvic pain. In the meantime, empiric laparoscopic inguinal exploration and mesh placement appears to be, at a minimum, a safe treatment option that may result in moderate improvement in select women with lateralizing chronic pelvic pain, most notably those with ipsilateral inguinal tenderness on pelvic examination and a positive Carnett's test in the ipsilateral abdominal lower quadrant.

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